PBW

Consulting Engineers and Scientists

PASTOR, BEHLING & WHEELER, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434
Fax (512) 671-3446

May 4, 2010
(PBW Project No. 1352)

VIA ELECTRONIC MAIL AND OVERNIGHT DELIVERY

Mr. Gary Miller, Remedial Project Manager
U.S. Environmental Protection Agency, Region 6
Superfund Division (6SF-AP)
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Ms. Barbara A. Nann, Assistant Regional Counsel
U.S. Environmental Protection Agency, Region 6
Superfund Division (6RC-S)
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Re: Additional Proposed RI/FS Contractor, Gulfco Marine Maintenance Site, Freeport, Texas

Dear Mr. Miller and Ms. Nann:

Pursuant to Section XI, Paragraph 42 of the amended Unilateral Administrative Order (UAO), effective January 31, 2008, for the above-referenced Site, Pastor, Behling & Wheeler, LLC (PBW), on behalf of LDL Coastal Limited LP (LDL), Chromalloy American Corporation (Chromalloy) and The Dow Chemical Company (Dow), herewith provides the names, titles, and qualifications for an additional contractor performing work in conjunction with RI/FS activities. In accordance with the requirements of Paragraph 52 of the UAO, I certify that I have been fully authorized by these Respondents to submit the information included herein and to legally bind these Respondents thereto.

URS Corporation will be performing ecological risk assessment and related activities on the project. URS' qualifications are provided as Attachment A to this letter. A copy of URS' Quality Management Plan (QMP) is provided as Attachment B to this letter. Consistent with the requirements of Section XI Paragraph 42, we will continue to notify EPA of any changes or additions to the RI/FS project team.

Thank you for the opportunity to submit this information. Should you have any questions, do not hesitate to contact me.

Sincerely,

PASTOR, BEHLING & WHEELER, LLC

Eric F. Pastor, P.E.
Principal Engineer

cc: Mr. Ray Merrell – Sequa Corporation
Mr. Brent Murray – Environmental Quality, Inc.
Mr. Donnie Belote - The Dow Chemical Company
Mr. Allen Daniels - LDL Coastal Limited, LP
Mr. F. William Mahley - Strasburger & Price, LLP
Mr. James C. Morriss III - Thompson & Knight, LLP
Ms. Elizabeth Webb - Thompson & Knight, LLP

ATTACHMENT A

URS CORPORATION
QUALIFICATIONS

URS Corporation Qualifications
Gulfco Marine Maintenance Superfund Site
Baseline Ecological Risk Assessment (BERA)

URS has over 150 technical professionals across the United States that conduct and support projects with ecological considerations. The ecological risk assessment activities at the Gulfco Marine Maintenance Superfund Site in Freeport Texas are following EPA's 1997 *Ecological Risk Assessment Guidance for Superfund.* URS brings two senior staff members with relevant experience in implementing EPA guidance as well as knowledge of the environmental setting of the Freeport area.

Mr. David Lingle is a Senior Project Manager with expertise in managing investigation and remediation phases of complex environmental projects, with an emphasis on contaminated sediment sites. He has approximately 15 years experience conducting screening-level and baseline ecological risk assessments for commercial clients in Texas, Louisiana, and California as both a project manager and task leader. Mr. Lingle has extensive experience in the interpretation and application of sediment quality guidelines in estuarine, marine, and freshwater environments. Mr. Lingle's work in the Freeport area includes conducting ecological risk evaluations for portions of the Brazos River (Tidal) and Freeport Harbor. His education includes a ME in Civil (Environmental) Engineering from Texas A&M University.

Ms. Margaret Roy has worked in the field of ecological risk assessment for over 18 years. She has conducted and directed numerous ecological risk assessments for multiple Air Force Bases and commercial clients. A relevant recent example of her project experience includes her role as task leader for the Malone Superfund Site BERA. Ms. Roy is currently the co-coordinator of the URS Ecosystems Management group. She has an M.S. in Environmental Toxicology/Science and a B.S. in Microbiology, both from Louisiana State University.

ATTACHMENT B

URS CORPORATION
QUALITY MANAGEMENT PLAN

QUALITY MANAGEMENT PLAN

Baseline Ecological Risk Assessment (BERA)
GULFCO MARINE MAINTENANCE SUPERFUND SITE
FREEPORT, BRAZORIA COUNTY, TEXAS

PREPARED FOR:

Environmental Protection Agency

on behalf of the

Gulfco Restoration Group

PREPARED BY:

URS

SIGNATURE PAGE

Quality Management Plan

for URS Corporation

Signature	Date:
David Lingle David Lingle, URS Project Manager	April 30, 2010
Margaret Roy Margaret Roy, URS Project QA/QC Officer	April 30, 2010
Don Price, P.G., URS Office QA/QC Officer	April 30, 2010
Bruce Broberg Bruce Broberg, P.E., VP, URS Office Manager	April 30, 2010

DISTRIBUTION LIST

Gary G. Miller, EPA Remedial Project Manager

David Lingle, URS Project Manager

Luda Voskov, P.G., TCEQ Project Manager

Eric F. Pastor, P.E., Pastor, Behling & Wheeler, Project Coordinator

Subcontractors

Revision Summary

Revision	Revision Date	Revisions
1	September 2007	Updated project manager and signature pages for Turtle Bayou (Far West Road) Superfund Site remedial activities.
2	November 2009	Updated project manager and signature pages for Brine Service Superfund Site remedial investigation/feasibility study. Updated references to URS Quality Management system to 2008 documents. Updated references to EPA Quality Management system documents.
3	April 2010	Updated project manager and signature pages for Gulfco Marine Maintenance Superfund Site –Baseline Ecological Risk Assessment (BERA) activities.

QUALITY MANAGEMENT PLAN
TABLE OF CONTENTS

FIGURES

TABLES

ABBREVIATIONS AND ACRONYMS

AOC	Administrative Order on Consent
ASQC	American Society for Quality Control
C-O-C	Chain-of-Custody
CQAPP	Construction Quality Assurance Project Plan
DQO	Data Quality Objective
EPA	United States Environmental Protection Agency
FAR	Federal Acquisition Regulation
HASP	Health and Safety Plan
FSP	Field Sampling Plan
LAN	Local Area Network
NELAP	National Environmental Laboratory Accreditation Program
PIC	Principal-in-Charge
PM	Project Manager
PRP	Potentially Responsible Party
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
QMP	Quality Management Plan
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
SMS	Safety Management Standard
SOP	Standard Operating Procedure
URS	URS Corporation
TL	Task Leader
TSA	Technical Systems Audit

1.0 INTRODUCTION

Quality Assurance (QA) is an integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the customer.

Quality Control (QC) is the overall system of technical activities that measures the attributes and performance of a process, item or service against defined standards to verify that they meet the stated requirements established by the customer; the QC system includes operational techniques and activities that are used to fulfill requirements for quality.

URS Corporation (URS) prepared this Quality Management Plan (QMP) for use on programs and projects managed or sponsored by or under the oversight of the U.S. Environmental Protection Agency EPA (EPA). This QMP documents how URS structures its quality system and describes its quality policies and procedures, criteria for and areas of application, and roles, responsibilities, and authorities. It also describes URS's policies and procedures for implementing and assessing the effectiveness of the quality system. The QMP supports EPA's site assessment activities; emergency response activities; prevention and preparedness activities; and technical support activities as they relate to the determination of: 1) the presence of environmental contaminants in areas of potential exposure to humans or the environment, 2) the impacts of environmental contaminants on human health and ecosystems, 3) whether, how, and by whom such threats to human health and the environment should be remediated, and 4) compliance with environmental regulations.

The format and topics addressed follow the guidance presented in EPA QA/R-2 "EPA Requirements for Quality Management Plans" (EPA 2001; Reissued May 31, 2006). Portions of this plan were compiled from standard requirements developed by the American Society for Quality Control (American Society for Quality Control (ASQC) 1994). These documents provided not only the materials to establish the framework for the URS Quality System, but also the guidance for establishing QA policies and methods for implementation.

URS has adopted the policy that Quality Systems are established for major contracts that incorporate specific regulatory and contractual requirements. This QMP defines aspects of the URS contract-specific Quality System for management oversight of planning, implementing, and assessing environmental programs and for design, construction and operation of engineered environmental systems.

The QMP also provides the framework necessary to create project-specific QA plans that are established to ensure that specifications and data generated and processed to make decisions during assessment, design and construction are scientifically sound, of known and documented quality, and where appropriate, legally defensible. Every attempt is made to achieve these goals in a cost-effective manner commensurate with the needs of the EPA and the scope of the project.

The QMP is the written directive that is adhered to by URS personnel and team subcontractors. In order to ensure that the plan is adequately implemented in a manner that works toward the success of the project, management techniques such as monitoring, review, and auditing are used. To maintain a viable and effective plan, the Quality System itself is subject to annual self or independent review by both program and corporate management.

Sections 2.0 through 11.0 of the QMP address the 10 Quality System elements identified in EPA QA/R-2.

- 2.0 Management and Organization
- 3.0 Quality System and Description
- 4.0 Personnel Qualifications and Training
- 5.0 Procurement of Items and Services
- 6.0 Documentation and Records
- 7.0 Computer Hardware and Software
- 8.0 Planning
- 9.0 Implementation of Work Processes
- 10.0 Assessment and Response
- 11.0 Quality Improvement

2.0 MANAGEMENT AND ORGANIZATION

QA is accomplished by experienced professionals working across all levels of management and throughout all assignments. The Quality System ensures that data of known quality are evaluated by capable personnel who are trained in the appropriate scientific and engineering disciplines. In addition, senior management oversight is provided to facilitate communication and understanding of EPA needs and to provide a management structure for senior technical oversight and review of individual projects.

The following subsections identify key management positions that have primary responsibilities relating to QA planning, implementation, assessment, design, construction, and operation for URS projects. In addition, specific responsibilities and relationships to other management positions, levels of accountability and authority, and lines of communication are itemized for these key positions. Figure 2-1 presents the QA Project Organization, which includes the EPA and URS QA management staff and any subcontractors.

In accordance with the organizational structure and management methodology established in the QMP for a program, Figure 2-1 presents a typical project-specific organization. This figure shows key positions along with lines of authority and lines of communication and coordination. Descriptions of the responsibilities and authorities for the key positions as they relate to project QA and QC are provided below. It is essential that individuals have defined responsibilities for their functional areas and are clearly aware of the entire project organization and interrelationships. As this is a project organization, senior officials, corporate managers, and agency administrators, whose positions are not functionally involved with data generation, data use, or decision-making, are not included.

QA personnel have sufficient authority, access to work areas, and organizational freedom to identify quality problems; to initiate, recommend or provide solutions to problems through established channels; and to verify solution implementation. Such personnel ensure that work, including any processing of information, delivery of products, and installation or use of equipment, is reviewed in accordance with QC objectives and that deficiencies and nonconformances are corrected. QA personnel have direct access to senior management, so that the required authority is provided where needed, to carry out QA duties.

2.1 EPA REMEDIAL PROJECT MANAGER

The EPA-assigned Remedial Project Manager (RPM) is responsible for coordinating project-related activities on behalf of the EPA. A major component of this position involves coordinating with the URS Project Manager (PM) and Potentially Responsible Parties (PRPs) in the execution of the work and the submission of deliverables as scheduled, in accordance with the Administrative Order on Consent (AOC). Specific responsibilities of the RPM are as follows:

- Provide oversight of project activities;
- Review and approve project plans (including SAPs) and coordinate review within EPA as necessary.
- Initiate the Data Quality Objective (DQO) process as appropriate, providing DQO framework to the URS PM;
- Review and approve the Quality Assurance Project Plan (QAPP);
- Ensure that the QAPP and associated reports are transmitted to the EPA Quality Assurance Officer (QAO);

- Transmit comments on QA from the EPA to the PM regarding QA plans and laboratory performance;
- Ensure that the PM addresses EPA review comments and takes appropriate action;
- Transmit program-wide quality issues to EPA Quality Assurance Officer (QAO); and
- Initiate field and laboratory audits and management system reviews.

2.2 EPA QUALITY ASSURANCE OFFICER

The EPA QAO or designee is responsible for ensuring that the project has an appropriate QA program. Specific responsibilities of this position are to support the EPA RPM on QA issues.

2.3 POTENTIALLY RESPONSIBLE PARTIES

The PRPs provide oversight and advice to the URS Project Manager and coordinate the execution of the AOC. These responsibilities are conducted through a committee established by the cooperating parties to the AOC. Day-to-day administration of the project may be delegated to a Project Coordinator. Specific responsibilities of the PRPs (or the Project Coordinator) are as follows:

- Provide oversight of project activities;
- Review and comment on project plans (including SAPs and QAPPs);
- Ensure that URS addresses EPA review and quality assurance comments and takes appropriate corrective action; and
- Document adherence to the AOC schedule and completion of activities scheduled in the Scope of Work.

2.4 URS QUALITY ASSURANCE OFFICER

The URS QAO communicates with the URS PM and URS Task Leaders (TL) and additionally has direct reporting access to the URS Corporate QA Director on quality-related matters. The QAO is responsible for the development, implementation and maintenance of the comprehensive URS Quality System. Responsibilities of this position include communicating with program and project management to ensure that a quality product is produced for delivery. Project-specific responsibilities of the QAO or designee are as follows:

- Serve as the official contact with EPA for QA matters related to the AOC;
- Respond to QA needs, resolve problems, and answer requests for guidance or assistance;
- Prepare the generic QAPP, and revise as necessary; provide guidance to the PM in the development of project-specific SAPs;
- Review and approve the project-specific SAPs;
- Together with the PM, assign competent, qualified Independent Reviewers to review the technical adequacy of deliverables;
- Track the progress and completion of the review and approval process;
- Ensure that EPA protocols and procedures, as well as URS Standard Operating Procedures (SOPs), are being followed;
- Review the implementation of selected SAPs and the adequacy of the data or products generated based on quality objectives;
- Initiate field and laboratory audits and management system reviews;
- Maintain a current list of approved QAPPs, SAPs, and SOPs to be used for auditing purposes;

- Authorize, coordinate, and conduct internal and subcontractor audits of selected projects for adherence to the project plans.
- Submit notice of any laboratory and field systems audits prior to their occurrence and in a timely manner to the EPA QAO who has the option to attend;
- Review audit and nonconformance reports to determine areas of poor quality or failure to adhere to established procedures;
- Confer with the audited entity on the steps to be taken for corrective actions and track nonconformance until it has been corrected; evaluate the adequacy and completeness of the action taken; confer with the PM or TL to resolve an inadequate corrective action; confirm the adequacy and the implementation of the response action;
- Suspend or stop work with the concurrence of the PM, TL, and EPA, upon detection and identification of an immediate adverse condition affecting the quality of results;
- Provide training on QA policies, procedures, and methodology;

2.5 URS PROJECT MANAGER

The URS PM reports to the Principal-in-Charge (PIC) and is responsible for providing senior leadership and expertise to individual TL. Responsibilities of the PM are to:

- Identify the need and expectations of services to be provided and when necessary, negotiate acceptable scopes of work;
- Provide senior level input and technical expertise to TLs on developing or establishing project objectives, data quality objectives, sampling rationale, regulatory requirements, and data assessment methods;
- Ensure that the best available technology is being applied to reduce potential waste and inefficiencies, and that the best known processes are in use;
- Perform readiness reviews and monitor the progress of work in relation to scope, cost, and schedule;
- Provide senior level coordination, review, and approval of project documents;
- Provide review of in-house project-specific models and programs prior to their use;
- Assess completion of work in accordance with EPA and regulatory requirements;
- Provide full assistance to the URS QAO and audit team during the planning, scheduling, and management of project-specific QA audits and surveillance; review assessment findings; and ensure that required corrective actions are completed;
- Confer with PM on activity-specific issues; and
- Refer quality problems and concerns to the URS QAO for investigation and/or resolution.

2.6 TASK LEADERS

The TLs are responsible for monitoring and documenting the quality of work produced by the project team, which includes the URS field staff and subcontractors. The fundamental goal of this position is to produce a quality work product within the allotted schedule and budget. Duties include executing all phases of the project and efficiently applying the full resources of the project team in accordance with the project plans. Specific responsibilities of a TL are as follows:

- Assist with determining DQOs.

- Prepare and implement the project SAPs (which incorporate applicable QAPP elements) and reports for each project, as appropriate;
- Ensure that SOPs are available and in use for activities that affect product quality and that assigned staff have been trained in their implementation;
- Inspect and accept supplies and consumables;
- Ensure that appropriate sampling, testing and analysis procedures are followed and that correct field laboratory quality control checks are implemented;
- Monitor sample preservation, handling, transport and custody throughout the project;
- Coordinate the appropriate disposition of investigation-derived waste;
- Ensure that the proper number and type of environmental and control samples are collected, identified, tracked, and sent to the laboratory for analysis;
- Coordinate and schedule sample shipment to analytical laboratories to meet holding times and analytical procedures specifications;
- Monitor team and subcontractors for compliance with both project and data quality requirements records, costs, and progress of the work; replan and reschedule work tasks as appropriate;
- Review and approve calculations to ensure that data reduction is performed in a manner that produces quality products;
- Verify data quality, test results, equipment calibrations, and QC documentation; maintain and regularly review QC records;
- Ensure that key decisions and project deliverables are subjected to independent technical review by qualified personnel within the time frame of the project schedule;
- Plan and schedule assessments in conjunction with the QAO and PM;
- Provide full assistance to the audit team during the conduct of project-specific QA audits.
- Review and respond to assessment findings; determine the root cause for the non-conformance; confer with the QAO on the steps to be taken for correction; and ensure that procedures are modified to reflect the corrective action and that they are distributed to field personnel, including subcontractors; and
- Report QA problems to the PM and QAO.

2.7 FIELD STAFF

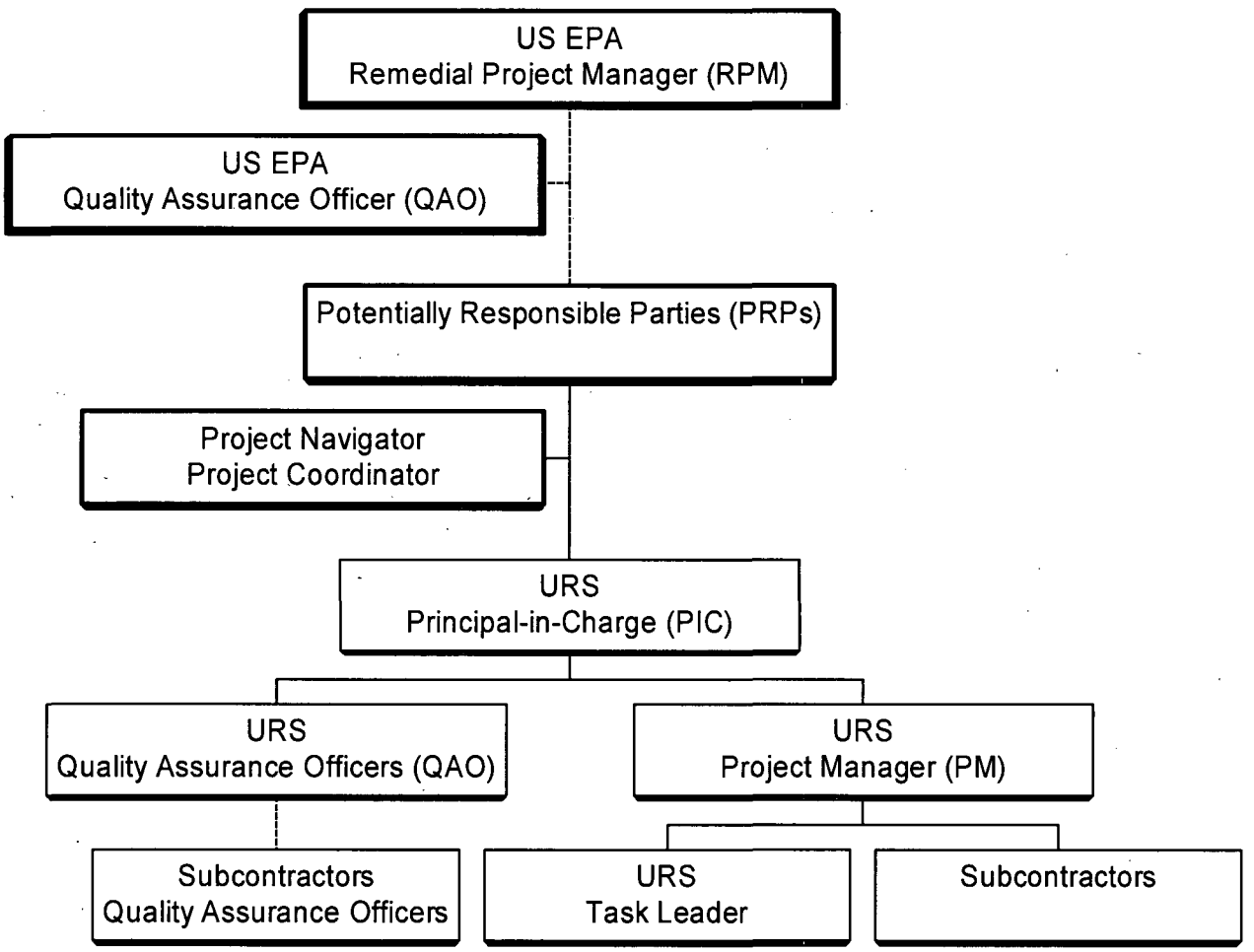
Under the direction of the TL, the Field Staff are responsible for the planning, coordinating, performing, and reporting of specific technical tasks. Responsibilities of the Field Staff are as follows:

- Implement the generic QAPP and project-specific SAP;
- Develop and maintain technical activity files and log books; and
- Implement technical procedures applicable to tasks.

2.8 SUBCONTRACTORS

URS personnel may delegate to others the responsibility of planning and executing certain portions of the project activities. When subcontractors are involved in activities covered by the requirements of the generic QAPP, the responsibility and authority of each subcontractor must be clearly established and documented. TLs are responsible for monitoring subcontractors for compliance with both project and data quality requirements.

Figure 2-1 QA Project Organization



3.0 QUALITY SYSTEM AND DESCRIPTION

The Quality System is implemented through systematic planning and assessment of activities undertaken by URS and includes provisions to ensure that the products or results of environmental projects are of the type and quality needed and expected by the EPA (Figure 3-1). QA/R-2 describes the two levels of management controls contained in the Quality System:

- Organizational level: Activities that support common or standardized functions fall under management systems at the organizational level. These functions establish the QA framework for performing work.

- Technical/project level: The technical or project level consists of the project-specific Quality System QA activities necessary to produce the desired type and quality of product defined at the organizational level.

3.1 TECHNICAL ACTIVITIES SUPPORTED BY THE QUALITY SYSTEM

The URS Quality System supports the three general types of activities to be performed by URS. These activities include:

- **Site Assessment**: Investigation, site characterization, ecological assessment, historical data evaluation, feasibility studies;

- **Remedial Response**: Removal Support, Engineering Evaluations and Cost Analyses; and

- **Technical Support**: Analytical Services, treatability studies, public participation support environmental/ecological evaluations, project work plans, and assessment of human health and ecological risks.

In order to fulfill the requirements of these technical activities, The URS Quality System provides for

- Training and development of staff;
- Assignment of personnel with relevant knowledge and experience for the specific task;
- Clear delineation of responsibilities and empowerment;
- Effective communication within the team, team partners, and the EPA throughout the project;
- Continual development of SOPs based on updated standards and guidelines;
- Independent technical reviews and audits for compliance with project plans, specifications, designs, procedures and regulatory requirements; and
- Corrective action taken when deviations from quality objectives are identified.

3.2 QUALITY SYSTEM COMPONENTS

EPA guidance documents, professional publications, URS corporate plans, and/or handbooks describe many of the components needed to implement the Quality System. Based on these references, URS has developed written plans, procedures and assessments for implementation of the URS Quality System. An overview of the primary components is presented below and summarized in Figure 3-1.

3.2.1 Quality Management Plans

The **Quality Management Plan** (QMP) (this document) describes the QA organizational structure, policies and procedures, functional responsibilities, levels of accountability and authority, and necessary interfaces associated with the URS Quality System. The QA policy and goals described in the QMP apply to activities conducted by URS personnel and subcontractors. The QMP provides the blueprint for how URS plans, implements and assesses its Quality System.

3.2.2 Quality Project Plans

The site assessment **Quality Assurance Project Plan (QAPP)**) presents the policies, organization, objectives, functional activities, procedures, and specific QA and QC activities, designed to achieve DQOs established for site assessment projects. The QAPP documents the framework for determining DQOs or acceptance criteria for a project, identifying the critical measurements to be performed, and discussing the QA activities to be conducted during the sampling, analytical, and validation phases of the project. Further discussion of QAPP requirements can be found in Section 8.2.

Project-specific **Field Sampling Plans** (FSPs) are developed for discrete sampling events performed under the site assessment program in accordance with EPA guidance (EPA 1988). The FSP presents the project background, description, specific DQOs, the sampling program to be employed, the project organization, and required QA procedures and reports. Further discussion of FSP requirements can be found in Section 8.3.

A **Removal Quality Assurance Project Plan** outlines the methods by which a removal design and construction project is measured and controlled to ensure the desired level of performance (EPA 1989). Specific information pertaining to removal QAPPs is presented in Section 8.4.

Site Health and Safety Plans (HASPs) are developed as directed and in accordance with the FSP and the URS Safety Management Standards (SMS).

3.3 QA AND TECHNICAL STANDARD OPERATING PROCEDURES

QA and technical SOPs have been compiled for environmental information and data gathering activities; repetitive tests and measurements; and inspection and maintenance of facilities, equipment, and services. Additional procedures are prepared as needed to address any new activities associated with the URS scope of work.

SOPs are developed whenever it becomes necessary to standardize routine tasks or activities. Procedures developed in support of this contract are clear, concise, and informative and use a standardized format. Sources of sampling and analytical methods used to prepare associated procedures are listed in the references. Further discussion of SOP development can be found in Section 9.2.1 of this plan.

3.4 DATA QUALITY OBJECTIVES PROCESS

It is the goal of EPA to collect data of sufficient quantity and quality to support defensible decision-making. At the same time, it is necessary to minimize expenditures related to data collection by eliminating unnecessary, duplicative, or overly precise data. In order to accomplish both of these goals, the objectives of the project, i.e., the type, quality, and quantity of data necessary to address the problem, are identified at the beginning of the project

using the DQO process. Further discussion of the DQO process is provided in Section 8.1.

3.5 MANAGEMENT AND TECHNICAL ASSESSMENTS

Assessments are conducted to increase management and technical staff understanding of the Quality System and to provide a basis for improving the system. Assessments may take two forms:

- Management and technical self-assessment, performed by someone responsible for overseeing and/or performing the work; and
- Management and technical independent assessment, performed by someone outside of the group performing the work.

Additional information on assessments and assessment tools (e.g., reviews, audits, surveillance) is provided in Section 10.

3.6 LABORATORY QUALITY ASSURANCE PLAN

The Laboratory QA Plan is a written description of the overall program of QA used by the laboratory to ensure that quality analytical data are generated. The plan describes the techniques the laboratory uses to control analytical processes, ensure calibration and measurement accuracy, and control samples and data throughout the laboratory. Further discussion of requirements for Laboratory QA Plans is provided in Section 5.2.

Figure 3-1 Quality System Planning Documents

EPA Guidance Documents

EPA Order 5360.1, Policy and Program Requirements to Implement the Mandatory Quality Assurance Program

EPA Requirements for Quality Management Plans
(EPA QA/R-2)

EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations
(EPA QA/R-5)

Quality System Management Plans

- Management Plan
- Quality Management Plan

Quality Project Plans

- Site Assessment Quality Assurance Project Plan
- Field Sampling Plan
- QA/QC Sampling Plan/ Work Plan
- Removal Quality Assurance Project Plan
- Site Health & Safety Plan

4.0 PERSONNEL QUALIFICATIONS AND TRAINING

The PM ensures that assigned program personnel (including subcontract personnel) performing tasks and functions related to data or product quality have the necessary education, experience, and training.

URS personnel are required to maintain appropriate qualifications for the duration of the project, including necessary federal/state certifications and requirements. The PM establishes the means (such as continuing education and peer reviews) to ensure that personnel (including managers and technical staff) demonstrate and maintain proficiency in performing their assigned work. Quality management training provides managers and technical personnel with a working understanding of the Quality System, along with the tools and techniques necessary to enable their full participation in planning, implementing and assessing Quality System components.

Training occurs for three of the URS activity categories: site assessment, remedial response, and technical support. Specific training needs are identified and prioritized and training is scheduled by the QAO, or PM based on both the immediate need of ongoing projects and the projected needs of future projects. Training needs are also identified by actual performance on the job as revealed by ongoing quality reviews that indicate performance deficiencies resulting from a lack of knowledge or skill. Training is continually reassessed, updated and implemented.

Most training is accomplished through mentorship of less experienced staff by fully trained and experienced supervisors and staff. This training occurs in the URS office and in the field. Group cross-training sessions are scheduled as time permits, to provide staff members the opportunity to enhance their skills and to ensure that sufficient experienced staff are available to accomplish a wide variety of tasks. Selected personnel participate in quality-related seminars, short courses, and professional meetings. In addition, continued professional development is encouraged through tuition assistance, and attendance at conferences and professional society meetings.

The QAO has overall responsibility for conducting QA training that includes both initial orientation and ongoing presentations. This approach is designed to maintain a high degree of awareness of QA methods, planning steps, guidance documents, and reporting requirements. Update training sessions are held when major revisions to the QMP, QAPP, or SOPs are made. Training updates may take the form of written memoranda. Training records are kept by the QAO indicating the training attendance, qualifications, certifications, method and extent of each staff member's training. These records are maintained within personnel files.

4.1 TRAINING DEVELOPMENT

Training programs take accepted instructional design principles into consideration as follows:

- Task analysis to identify specific skills needed to perform the task and for the underlying knowledge or skill that supports task performance;
- Review of objectives to ensure changes required by task analysis findings are incorporated. The objectives specify training outcomes;

- Analysis of intended participants to ensure training development considers their entry level skill, knowledge, interests, prior experience, and learning styles;
- Identification of prerequisite skill and knowledge to determine how the content and instructional events are organized, ensuring that instruction proceeds logically from the known to the unknown;
- Selection of instructional methods and media to most effectively conduct the training. Typically, there is a combination of the methods of lecture, discussion, demonstration, simulation, and role-play. Supervised learning on-the-job, as well as computer-based training or interactive video displays, are also considered when they are likely to be more effective or if there are only a few participants for training. Media selection is based on the objectives, instructional content, and overall instructional strategy;
- Evaluations during and at the end of training. Evaluations are designed to ensure that expected training outcomes are measured, as well as to provide feedback to the participants;
- Revision of content based on the evaluations and new job conditions that require revision in instructional content; and
- Use of appropriate off-the-shelf course work or outside sources, such as universities or training vendors, when internal development is not the most effective strategy.

4.2 INSTRUCTOR QUALIFICATIONS

Instructors are subject matter experts who have either developed the training or received instruction on how to train. They are observed by supervisors when they first conduct training and periodically thereafter. Instructors who require certification must have such certifications, and keep them active, before they are allowed to serve as instructors. Instructors are hired, or they are employees who are assigned instructional duties because of their knowledge and skill. Subject matter experts are approved by the PM for prerequisite education, training or certification, as well as instructional ability, before becoming instructors. Training materials are reviewed by the appropriate supervisor to ensure the material is current and revisions are made as appropriate.

4.3 EVALUATION

Transfer of training to the job is monitored by follow-up evaluations after the employees return to their respective jobs and by review of Performance Evaluation Ratings. The evaluations are made by the QAO and other management staff who are responsible for the work being evaluated. Training programs may be revised in response to the various training evaluations.

4.4 REGULATORY AWARENESS PROCESS

URS staff members are required to maintain regulatory awareness in their respective technical areas. To fulfill this requirement, URS maintains on-line subscriptions to BNA Environmental Reporter, regulatory databases, and subscriptions to a wide variety of environmental journals and newsletters.

URS technical personnel are 40-hour OSHA certified and receive annual 8-hour refresher training that includes updates on newly enacted legislation and regulations.

5.0 PROCUREMENT OF ITEMS AND SERVICES

The procurement of purchased items and services is planned and controlled to ensure that the quality of the items and services is known, documented, and meets the requirements and expectations of the EPA and the Federal Acquisition Regulations (FAR). Section 6.4 of the URS Quality Management System Policy (URS 2008) describes the quality requirements associated with procurement.

As a part of the procurement qualification process, subcontractors who provide services or items that directly affect the quality of results or products from environmental programs are required to establish and implement QA plans and operating procedures consistent with EPA QA requirements. The laboratory QA Plan is an example of a document required by the procurement process that demonstrates a laboratory's ability to generate quality data. In addition, subcontractor deliverables must meet established QA criteria based upon objective evidence of performance. TLs are responsible for continual monitoring of subcontractor compliance with QA requirements. Finally, subcontractors are subject to periodic audit to substantiate compliance.

Supplies, equipment, and services are evaluated, selected, and maintained by the Equipment Manager and TLs to meet project quality goals. Facility surveys, equipment performance evaluations, subcontractor qualifications, and quality record reviews are among the methods that are employed to measure against established performance standards.

5.1 CONTROL OF EQUIPMENT

Equipment and instruments used for the URS program are calibrated, adjusted, and maintained to operate within manufacturers' specifications and SOPs. These procedures are performed to maintain the necessary accuracy, precision, sensitivity, and traceability for making reliable measurements or collecting representative samples. This effort is conducted by trained technicians using service manuals or through service agreements with a qualified maintenance contractor. Calibration and maintenance schedules and records are maintained for the equipment. Both equipment and equipment records are located in a controlled access facility when not in use.

Guidelines for the calibration, adjustment, maintenance, inspection and testing of equipment are documented in equipment-specific SOPs that address topics or reference an operating manual containing the following information:

- Operational theory;
- Inspection and testing;
- Functional checks and adjustments;
- Calibration;
- Special environmental conditions or interferences;
- Routine and corrective maintenance;
- Decontamination;
- Deactivation and storage;
- Equipment records; and
- Simplified operational instructions.

Preventive maintenance, based on the type of equipment, stability characteristics, required accuracy, intended use, and environmental factors (such as, temperature, humidity, etc.) is implemented on a scheduled basis to minimize downtime and to ensure accurate measurements from both field and laboratory equipment. Equipment that is identified to be out-of-calibration or malfunctioning is removed from operation until re-calibrated or repaired. In addition, backup equipment and critical spare parts are maintained to quickly correct equipment malfunction.

5.2 LABORATORY MANAGEMENT

URS provides guidelines to ensure that laboratories procured through subcontracts meet requirements for a QA program that facilitates the generation of valid data of known and acceptable quality. This goal is accomplished through one or more of the following: review of laboratory QA plans and SOPs; examination of existing laboratory accreditations; analysis of performance samples; and laboratory inspections and audits prior to environmental sample analysis. Proper communication of analytical QC requirements prior to sample analysis and establishment of plans for maintaining the QC program during the course of work are important contributors to quality data.

Each subcontracted laboratory is required to submit for review, a Laboratory QA Plan that describes the approach to ensuring that quality data are generated from sample analysis. The Laboratory QA Plan includes the following topics:

- Title page with approval signatures;
- Laboratory organization and personnel responsibilities;
- Personnel qualifications and training;
- Laboratory facilities and equipment;
- Equipment maintenance;
- Material procurement and control;
- Sample handling and chain of custody;
- Calibration procedures;
- Analytical procedures;
- Limits of detection;
- Analysis and documentation of QC samples;
- Data assessment procedures for accuracy and precision;
- Data evaluation and data reduction;
- Out-of-control events and corrective action;
- Internal laboratory audits;
- Document control and archiving; and
- QA reports.

Programs and laboratory accreditations such as the National Environmental Laboratory Accreditation Program (NELAP) have most elements of the laboratory approval process in place. Documentation from these programs may be used in place of conducting the corresponding approval task.

When a laboratory is required to demonstrate its ability to successfully analyze performance samples, this may be accomplished through providing documentation of recent proficiency testing results conducted by an independent

reviewer (preferably a government agency) using standard EPA-approved analytical methods. Otherwise, prior to beginning analysis of field-collected samples, the laboratory may analyze a performance sample for chemical substances representative of those anticipated in environmental samples. The purpose of proficiency testing is to determine laboratory proficiency with sample analysis designed to simulate environmental field conditions.

Under certain circumstances, an inspection of actual laboratory operations or an audit of laboratory methods and procedures is conducted. Circumstances that would cause on-site inspections or audits would typically involve concerns of laboratory performance or practices, verification of laboratory capabilities, observation of laboratory practices and adherence to QA guidelines, or difficulties in satisfactorily achieving the other steps in the laboratory approval process. Overall, the purpose of laboratory inspection is to verify that the established QC requirements are being met by the routine operation of the laboratory. Four steps are involved in this process, as follows:

- Overview and Orientation - Discussing with laboratory personnel the objectives and schedule of the on-site inspection or audit;

- Observation, Examination, and Review - Witnessing actual analytical procedures, following the steps for sample handling and storage, examining QC records and control charts, and reviewing corrective action reports for out-of-control events;

- Findings - Conducting an exit interview that details the results of the on-site inspection or audit and identifying deficiencies to be addressed by corrective action; and

- Corrective Action - Reviewing the plan prepared by the laboratory that addresses the deficiencies identified by inspection.

6.0 DOCUMENTATION AND RECORDS

The PM is responsible for ensuring that effective document control procedures are established, implemented, and maintained. Document control is a management tool used to establish a thorough record of project activity that includes (but is not limited to) correspondence, deliverables, receipts and invoices, technical data, and anything else that is deemed important for project documentation and historical reference.

The URS document control system begins with identifying, preparing, reviewing, approving, and distributing pertinent documents and records. The responsibilities for each of these activities are defined throughout this QMP as they apply to program and project planning and assessment. Generally the PM and QAO prepare program documents and the TLs prepare project documents. Reviews are accomplished by independent and peer reviewers. Approval authority lies with the QAO and the PM (refer to Section 10.3.4, Independent Technical Review and Peer Review).

The Quality System requires that documentation be legible, dated (including revision dates), clean, readily identifiable, and maintained in an orderly manner. Where evidentiary records are involved, the maintenance of records also includes establishing and implementing appropriate chain of custody and confidentiality procedures for the affected records.

Active controlled documents are maintained either in the URS office that has restricted access or in a secured off-site storage facility that is designed to ensure document protection, preservation, traceability, and retrievability. Accounting and procurement documents are controlled by their respective departments. In-progress technical data and project documents are controlled by the TLs. Administrative documents are controlled by the Administrative Assistant.

The requirements for long-term controlling and archiving of original documents are based on URS policy requirements, or as specified by EPA. While in storage, records are protected from damage, loss, and deterioration.

Documents and records that are controlled include:

- QA Project Plans;
- Field Sampling Plans;
- Site Health and Safety Plans;
- Quality Assurance Reviews;
- Response to Comments;
- Calculation Sheets;
- Drawings
- Standard Operating Procedures;
- Technical Memoranda;
- Draft and Final Reports;
- Design specifications;
- Blueprints; and
- Independent Technical Reviews/comment

In addition, the following documents are controlled to reflect the achievement of the required quality for completed work and/or to fulfill any statutory requirements. These documents may be in the form of printed and electronic media as specified, and include:

- Sampling and analytical data;
- Field logs and measurements;
- Instrument test data;
- Calibration data;
- QC data;
- Inspection results;
- Materials testing results;
- Technical and readiness reviews results;
- Cost estimates;
- Design assumptions and calculations;
- Construction submittals, plans, and schedules;
- Record drawings;
- Assessment results; and
- Data usability results.

7.0 COMPUTER HARDWARE AND SOFTWARE

The URS Computer hardware/connectivity system consists of a URS work station host server, a URS Local Area Network (LAN), and desktop and portable PCs and printers. Requests for procurement of new hardware must include an evaluation of the effect of the changes on program and project performance.

Both URS and EPA licensed software are available. The initiator of a request for new or adaptations of existing software must thoroughly document the intended use and required interfaces. Computer programs available include but are not limited to design, design analysis, modeling of environmental processes and conditions, operations or process control, and data bases or document control registers.

Software proposed for purchase is approved by the PM and the Office Manager, and is consistent and compatible to the extent possible with EPA software and applications. Prior to purchase or development, software is evaluated for:

- Compatibility of the hardware/software combination; and
- Suitability of the software to the project need.

Internally developed applications related to accounting, equipment inventory and other project specific tasks follow an approved software development methodology. Internally developed applications include:

- Operating instructions for the program;
- Description of program computations, including simulation limitations, as applicable; and
- Information to allow future modification of the program.

Internal application documentation includes, but is not limited to:

- Software identification including version status;
- Program application and limitations;
- Hardware compatibility requirements;
- Application test data set and associated output; and
- Verification determination.

An application test data set, associated output, and verification determination is developed and performed for purchased software and spreadsheets to assure that engineering and data calculations obtained from that software are accurate. At a minimum, a calculation sheet is completed confirming, via hand calculation, the results of spreadsheet computations (refer to Section 10.3.6). Software audits are conducted to ensure that software is properly licensed.

7.1 DATA MAINTENANCE AND STORAGE

In order to maintain quality data, computer virus protection software is utilized on PCs. Electronic files acquired from outside the URS office are scanned before use.

Most documents and data files are stored on the URS LAN server. Files on that system are backed up daily, weekly and monthly. These backups capture database files, documents and user files.

8.0 PLANNING

The URS PM and TLs are responsible for planning work involving the generation, acquisition, and use of environmental data or information. The type and quality of environmental data or information needed are defined and documented using a systematic planning process, DQOs. The project-specific planning includes the PRPs, EPA RPM or other EPA contact that has requested the data or information, as well as the URS technical staff responsible for obtaining, analyzing, and evaluating the data. TLs are responsible for guiding and ensuring that planning activities are documented, and that participants are informed of and understand completely the requirements of the project. Results of planning activities are subject to review by EPA and URS management for conformance to technical scope and quality expectations. Project planning for information and data collection and evaluation includes:

- Definition of project/task scope, technical objectives and quality goals and the desired action or result from the work;
- Identification of parties (in addition to EPA and URS personnel) that need to participate in the project and their role in planning, implementation, and assessment activities;
- Identification of unique planning requirements based on the applicable environmental programs;
- Identification of the required information or data to achieve the desired action or result;
- Identification of QA and QC requirements to establish the needed quality and quantity of the information or data collected or produced to support decision-making. Determination of data quality indicators, acceptable level of confidence, statistical assessment of uncertainty, and level of data validation and verification needed.
- Identification of the extent of documentation needed to adequately describe the quality of the results;
- Identification of required personnel skills, technical disciplines, and types of equipment;
- Identification of special applicable regulatory requirements;
- Consideration of budget and scheduling constraints;
- Determination of assessment tools needed to ensure that project goals and objectives are being met (e.g., independent technical reviews, peer reviews, field inspections, readiness reviews, and technical audits);
- Identification of methods/procedures for storing, analyzing, and reporting the data produced based on the intended use of the data; and
- Identification of possible methods/procedures (including waste minimization objectives) for testing and disposing of contaminated sample material that may be accumulated during the project.

Table 8-1 summarizes QA document requirements including responsible initiators and review requirements.

8.1 DATA QUALITY OBJECTIVES

It is the goal of EPA and the regulated community to minimize expenditures related to data collection by eliminating unnecessary, duplicative, or overly precise data. At the same time, it is necessary to collect data of sufficient quantity and quality to support defensible decision-making. The most efficient way to accomplish both of these goals is to begin each project by implementing the DQO Process (Figure 8-1) and by ascertaining the type, quality, and quantity of data necessary to address site-specific problems (EPA 2006). It is the responsibility of the

PM, in conjunction with the QAO, to implement the DQO process as part of the project planning activities.

8.1.1 Data Categories

These data categories are associated with specific QA and QC elements, and may be generated using a wide range of analytical methods. The particular type of data to be generated depends on the qualitative and quantitative DQOs developed during application of the DQO Process.

Screening Data with Definitive Confirmation: Screening data are generated by rapid, less precise methods of analysis and less rigorous sample preparation. Screening data provide analyte identification and quantification, although the quantification may be relatively imprecise. At least 10% of the screening data are confirmed using analytical methods and QA/QC procedures and criteria associated with definitive data. Screening data without associated confirmation data are not considered to be data of known quality.

Definitive Data: Definitive data are generated using rigorous analytical methods, such as approved EPA reference methods. Data are analyte-specific, with confirmation of analyte identity and concentration. Methods produce tangible raw data (e.g., chromatograms, spectra, digital values) in the form of paper printouts or computer-generated electronic files. Data may be generated at the site or at an off-site location, as long as the QA/QC requirements are satisfied. For the data to be definitive, either analytical or total measurement error must be determined.

8.1.2 Data Assessment Parameters

Site-specific acceptance criteria are established for each of the five data assessment parameters identified by the EPA. These objectives are expressed as quantitative and qualitative statements concerning the type of data needed to support a decision, based on a specified level of uncertainty. Data are reconciled with stated DQOs by calculations for accuracy, precision, and completeness, and statements on representativeness and comparability. The data assessment parameters are:

Precision is a measure of mutual agreement among replicate (or between duplicate) or collocated sample measurements of the same analyte. The closer the numerical values of the measurements are to each other, the more precise the measurement. Precision for a single analyte is expressed as the relative percent difference of replicate or collocated samples. Tools for demonstrating the precision of the measurement process are replicate samples, collocated samples, inter/intra laboratory testing, instrument checks,

Accuracy is a measure of bias in a measurement system. The closer the value of the measurement agrees with the true value, the more accurate the measurement. Accuracy is expressed as the percent recovery of the surrogate or spike analyte from a sample or standard. Accuracy is dependent on traceability of instrumentation, standards, samples, and data; methodology; reference or spiked samples; performance samples; and equipment calibration.

Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. The closer the numbers are, the more complete the measurement process. Completeness is expressed as the percentage of valid-to-planned measurements. A sufficient volume of sample material is collected to complete the required analyses, so that samples represent possible contaminant situations under investigation as well as background and control areas. Completeness is influenced by environmental conditions, potential for

change with respect to time and location, equipment maintenance, data records, sampling location, sample volume, QC samples, and sample representativeness.

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. The comparability goal is achieved through the use of SOPs to collect and analyze representative samples, by reporting analytical results in appropriate and consistent units and by maintaining consistency in sampling conditions, selection of sampling procedures, sample preservation methods, and analytical methods.

Representativeness is a qualitative parameter that expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. The design of and rationale for the sampling program (in terms of the purpose for sampling, selection of sampling locations, the number of samples to be collected, the ambient conditions for sample collection, the frequencies and timing for sampling, and the sampling techniques) ensure that environmental conditions have been sufficiently represented.

8.2 QUALITY ASSURANCE PROJECT PLANS

The QAPP is the documentation resulting from the DQO Process for projects that require environmentally related measurements. The QAPP ensures that the required level of data quality is established at the beginning of the project and that data generated and processed are of the quality and integrity required. The QAPP is used at three fundamental phases during the execution of a project:

- Project start-up planning allowing EPA and URS personnel an opportunity to prepare and review plans from a QA viewpoint;
- Throughout the project, as a guide for real-time QA reviews and audits; and
- Project closeout, as a basis for assessing whether the project attained the stated goals.

The QAPP presents detailed quantitative targets for the quality of the sampling, laboratory analysis, and data review and describes the methodology used to ensure that the targets are met. The QAPP facilitates appropriate quality collection and assessment of data. The PM is responsible for preparing the QAPP. The QAO or designee with the concurrence with the PM, assesses the QAPP, recommends changes, and approves QAPPs.

The content and level of detail in each QAPP varies according to the nature of the work and the intended use of the data. Because of the diversity in the type of work being provided and the intended use of the data, a graded approach to the level of detail has been established by the EPA in QA/R-5 (EPA 2001; Reissued May 31, 2006).

Site Assessment activities include environmental data operations performed as interim steps of a larger group of operations. Such projects include work producing results that are used to evaluate and select options for interim decisions or to perform feasibility studies or preliminary assessments of unexplored areas for possible future work. For Site Assessment activities, a QAPP, as outlined below, will be prepared and included in FSPs.

1. Project Management

- Title and Approval Sheet
- Table of Contents
- Distribution List
- Project/Task Organization
- Problem Definition/Background
- Project/Task Description
- Data Quality Objectives for Measurement Data
- Project Narrative
- Special Training Requirements/Certification
- Documentation and Records

2. Data Generation and Acquisition
   - Sample Process Design (Experimental Design)
   - Sampling Methods
   - Sample Handling and Custody
   - Analytical Methods
   - Quality Control
   - Instrument/Equipment Testing, Inspection, and Maintenance
   - Instrument Calibration and Frequency
   - Inspection/Acceptance Requirements for Supplies and Consumables
   - Non-Direct Measurements
   - Data Management
3. Assessment/Oversight
   - Assessment and Response Actions
   - Reports to Management
4. Data Validation and Usability Elements
   - Data Review, Validation, and Verification
   - Validation and Verification Methods
   - Reconciliation with Data Quality Objectives

The QAPP will be prepared in a controlled document format, with provision for both a record of revision and a record of distribution. The QAPP will document the DQOs or acceptance criteria for projects, identifying the critical measurements to be performed, and discussing the QA activities to be conducted during the sampling, analytical, and validation phases of a project. Project specific DQOs and acceptance criteria are included in the project-specific FSP.

8.3 FIELD SAMPLING PLAN

An FSP is developed for discrete sampling events in accordance with EPA guidance (EPA 1988). These plans are complementary to QAPPs, presenting similar information but differing in the planning perspective. For site assessment activities, project-specific information required in the generic QAPP is provided in the FSP.

The FSP includes the following information:

- Introduction
- Site background: Site location and description, site operations and waste characteristics
- Project description: Objectives and scope, anticipated data types and uses;
- Sampling program: Sampling methods, analytical and handling requirements, equipment decontamination, investigation-derived wastes, personnel health and safety;
- Project management: Organization and responsibility, schedule of tasks/milestones;
- QA procedures: QC checks, corrective action, performance and system audits, QA reports
- Project-specific QA requirements: QC sample quantities, DQOs, analytical specifications;
- Reporting requirements; and
- References.

8.4 ENVIRONMENTAL TECHNOLOGY DESIGN, CONSTRUCTION AND OPERATION QA PROJECT PLANS

This QAPP is the planning documentation for projects that require the design, construction, and operation of environmental technology projects. Design and construction planning involves the use of technical and engineering principles and practices to ensure that the removal meets or exceeds design criteria, plans, and specifications. Environmental technology involves both construction QC, (i.e., the planned system of inspections that are used to directly monitor and control the quality of a construction project) and construction QA (i.e., the planned system of activities that provide assurance that the facility was constructed as specified).

The TL is responsible for preparing a QAPP for an environmental technology design, construction and operation project. The format and content of a QAPP for an environmental technology project incorporates the QA principles presented in the QMP and addresses EPA requirements for design and construction projects (EPA 2005a). A URS QAPP for design and construction contains the following elements:

- Title page with provision for approval signatures;
- Introduction;
- Project description;
- Project organization and responsibilities;
- Quality assurance requirements;
- Design control;
- Supplier selection;
- Procurement control;
- Inspection activities and compliance monitoring;
- Control of measuring and test equipment;
- Evaluation and testing of items;
- Control of nonconforming items;
- Corrective action;
- Quality records; and
- Audits.

8.5 HEALTH AND SAFETY PLANS

HASPs are developed or adopted for all activities at a site and are consistent with the protocols described in the URS SMSs. The HASP is reviewed and approved by the URS Health and Safety Officer or a designee. The Health and Safety Officer has the authority to suspend or stop work with the concurrence of the EPA and PM upon detection and identification of an immediate adverse condition affecting the health and safety of personnel.

Figure 8-1 The Data Quality Objectives Process

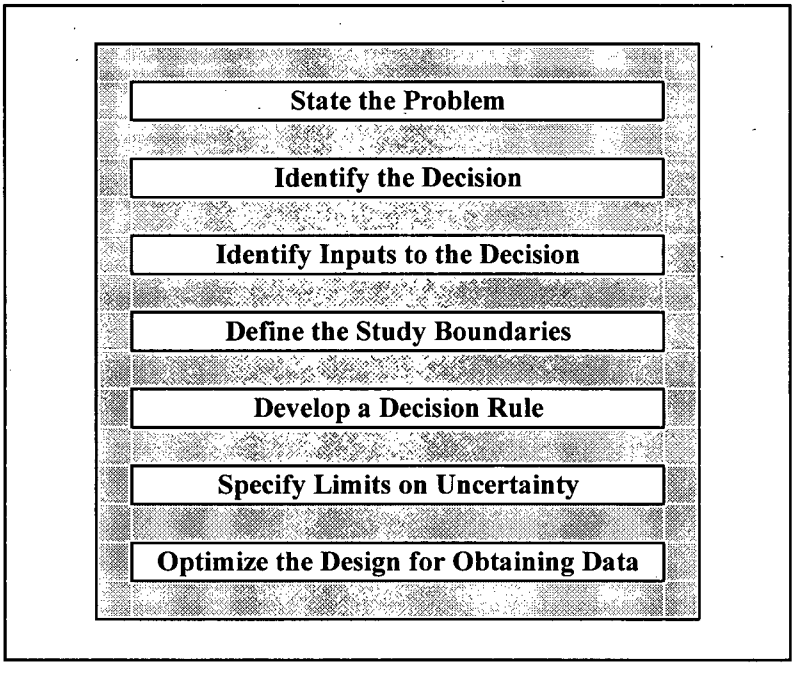


Table 8-1 Quality Assurance Communications Requirements

	Document	Responsible Initiator	How Often Issued	Review Requirement	Follow-up Action (if any)
1	Quality Mgt Plan	QAO	Once and revisions thereafter	PM Responsible EPA Official	QAO
2	QA Project Plan	QAO	Once for each project and revisions thereafter	PM Responsible EPA Official	QAO
	Field Sampling Plan	Team Leader	Once for each project and revisions thereafter	PM Responsible EPA Official	Team Leader
	Removal Quality Assurance Project Plan	Team Leader	Once for each project and revisions thereafter	PM, QAO Responsible EPA Official	Team Leader
	QA/QC Sampling Plan/Work Plan	Team Leader	Once for each project and revisions thereafter	PM, QAO Responsible EPA Official	Team Leader
3	Standard Operating Procedure	PM QAO	Once for URS project and revisions thereafter	QAO Responsible EPA Official	QAO
4	QA Annual Report and Work Plan	QAO	Annually	PM Responsible EPA Official	QAO
5	Performance & System Audits Surveillance	QAO	Once for each scheduled audit	PM QAO	Team Leader
6	Independent Technical Review	Team Leader	Once for each review	PM or TL QAO	Team Leader

9.0 IMPLEMENTATION OF WORK PROCESSES

The following sections describe the implementation procedures for quality management.

9.1 RESPONSIBILITY FOR IMPLEMENTATION

The PM in conjunction with the QAO is responsible for the implementation of the QMP, SOPs, and audits which are the fundamental components of the Quality System. The TL is responsible for the successful implementation of the site-specific plans and procedures.

Environmental data collection is implemented by qualified personnel according to approved project plans and procedures in a manner that ensures that the type and quality of environmental data required and expected are obtained. Deviations from approved plans and procedures require the concurrence of the PM (and the EPA responsible party, if significant) and are thoroughly documented. The impact and significance of the deviations on planned operations are determined and appropriate adjustments to such operations are made as needed. Changes to planning documents and operating guides and manuals are made and distributed to project personnel to replace previous documents.

9.2 MECHANISMS FOR IMPLEMENTATION

The QMP and QAPPs identify mechanisms that ensure that work is performed according to plans and commensurate with project DQOs. The TL is responsible for coordinating and implementing activities according to SOPs and the project-specific QAPPs. In order to meet the quality requirements of these documents, the TL ensures that:

- Only qualified and accepted services and items are used in the environmental data operations.
- Inspections and acceptance testing of field sampling, measurement, and analytical instrumentation (or other measurement systems) and equipment are performed.
- Field equipment used for data acquisition are operated and calibrated in accordance with the manufacturers' instructions and URS SOPs.
- Periodic preventive and corrective maintenance of measurement and testing equipment is performed to ensure availability and satisfactory performance of the equipment.
- Handling, storage, cleaning, packaging, shipping, and preservation of field and laboratory samples are performed according to URS SOPs to prevent damage, loss, deterioration, or contamination of the samples.
- Standard sample labels are attached to the sample container and provide sample inventory control information that is recorded on the chain-of-custody (C-O-C) form and that the C-O-C forms are tracked and documented.
- Data or information management, including transmittal, storage, validation, assessment, processing, and retrieval, is performed in accordance with the approved instructions, methods, and procedures. Data recorded in a structured digital format is made available to EPA in a specified format and on appropriate magnetic media when requested.
- Information sources used to obtain data include: EPA personnel and files; federal, state, and local agencies; published and unpublished documents; knowledgeable personnel and contacts; and direct measurement or observation.

- Sufficient documentation is maintained to allow an independent evaluation of the data including its source, validity, and quality and that information collected appears in field logbooks, letters, meeting notes, telephone conversation records, memoranda, reports, and data collection forms.
- Field data acquisition is based on recognized standards and methods. These methods are evaluated before and during application to verify accuracy, suitability, and repeatability.

9.2.1 Standard Operating Procedures

URS has identified, prepared and implemented SOPs that are used for information and data gathering activities. The SOPs are consistent with current regulations and guidelines and are clear and concise. The SOPs are complete and contain directions that can be followed in a stepwise manner. They are based on sound scientific technical and engineering principles.

URS personnel follow the SOPs unless specifically instructed otherwise. Each TL is responsible for ensuring that SOPs are available, before tasks are implemented, for any activity affecting quality of data. URS has prepared SOPs that cover:

- Equipment
- Quality assurance
- Technical SOPs
- Analytical services
- Health and Safety

SOP 2.1 "Standard Operating Procedure Preparation" establishes the outline, format and method to be used in preparing, reviewing, and approving SOPs. Revisions to an existing SOP follow the same procedures. SOPs may be written by any technical individual or group, but in all cases they are authorized by the PM and QAO. The QAO ensures that SOPs are incorporated into project plans, monitored and assessed for projects.

9.2.2 Quality Control Checks

QC samples are not collected and analyzed in all circumstances. The number and type of QC samples collected are determined by the type of data to be collected as identified during the DQO process. QC checks of both field sampling and laboratory sample analysis are used to assess and document data quality and to identify discrepancies in the measurement process that need correction. QC samples are used to determine the representativeness of the environmental samples, the precision of sample collection and handling procedures, the thoroughness of the field equipment decontamination procedures, and the accuracy of laboratory analysis.

In addition to field QC samples, the analytical laboratory uses a series of QC samples specified in each standard analytical method to assess laboratory performance. The types of laboratory QC samples are method blank, laboratory control standard, duplicate, matrix spike, and matrix spike duplicate. Analyses of laboratory QC samples are performed for samples of similar matrix type and concentration and for each sample batch. QC samples collected to assess field sample collection procedures are as follows.

Field Blanks are used to indicate the presence of external contaminants that may have been introduced into the samples during collection.

Trip Blanks are used to assess contamination introduced into the sample containers by volatile organics through diffusion during sample transport and storage.

Equipment Blanks (equipment decontamination rinsates) are used to assess the adequacy of practices to prevent cross-contamination between sampling locations and samples.

Field Replicates (or duplicates) are collected at selected locations to provide estimates of the total sampling and analytical precision. At least one replicate sample is analyzed from each group of 20 samples of a similar matrix type and concentration.

Standard Reference Samples are used to assess the accuracy of the analytical methods specified and to assess the performance of the laboratory sample analysis. These samples are prepared with a known composition and analyte concentration by an independent laboratory and submitted to the analytical laboratory as unknown samples.

9.2.3 Data Validation

The purpose of the validation process is to eliminate unacceptable analytical data and to designate a data qualifier for any data quality limitation discovered. In some instances, the analytical data may be used only for approximation purposes. Data validation criteria are discussed below for both field and laboratory data.

Field Data Validation is conducted to eliminate data that are not collected or documented in accordance with specified protocols outlined in the QAPP and FSP. In some instances, the field data are used only for approximation purposes and do not require validation. Validation of field data is performed on two separate levels. First, field data are validated at the time of collection by following the QC checks outlined in the QAPP and FSP. Second, the TL reviews the field data documentation to identify discrepancies or unclear entries. Field data documentation are validated against the following criteria:

- Sample location and adherence to the plan;
- Field instrumentation calibration;
- Sample collection protocol;
- Sample volume;
- Sample preservation;
- Blanks collected and submitted with each respective sample set;
- Duplicates collected and submitted with each respective sample set;
- Sample documentation protocols;
- C-O-C protocol; and
- Sample handling and shipment.

The QAO or designee conducts Analytical Data Validation. The quality control data requirements and deliverables are specified in the QAPP. The data report is then validated in accordance with the criteria contained in EPA guidance documents modified for the analytical method used. Data validation reports are filed with the data and describe the usability of the data for further technical interpretations. Analytical data are validated against the following criteria:

- Holding times;
- Instrument performance checks;
- Initial and continuing calibration;
- Blank analyses;
- Laboratory QC compounds and standards;
- Field duplicates analysis;
- Internal standard performance;
- Compound identification and compound quantitation;
- Reported detection limits;
- System performance; and
- Overall assessment of data.

9.2.4 Systems and Performance Audits

Systems and performance audits are conducted to confirm adherence to QA plans and to document deficiencies in the QA and QC systems. Systems audits ensure that measurement systems generate quality data, that management systems sufficiently implement the QA System, and that subcontractors perform work within established QA guidelines. Performance audits are conducted for each major environmental monitoring and data collection activity soon after the measurement system is generating data and on a regularly scheduled basis thereafter, as defined in the QAPP. Refer also to Section 10 of this QMP.

9.2.5 Inspection Documentation

SOPs for Construction Quality Assurance Project Plans (CQAPPs) for construction oversight define the activities that fulfill the project requirements. Inspectors record descriptive remarks on data sheets and checklists signed by them verifying that the inspection activities have been accomplished.

Observations and field tests are recorded on inspection data sheets. Recorded observations take the form of notes, charts, sketches, photographs, or any combination of these. Checklists ensure that no pertinent factors of a specific observation are overlooked. At a minimum, the inspection data sheets are prepared daily and include the following information:

- Personnel involved in the inspection activity;
- Description or title of the inspection activity;
- Location of the inspection activity or location from which the sample increment was obtained;
- Date and data on weather conditions;
- Report on any meetings held and their results;
- Unit processes and locations of construction underway;
- Equipment being used in each unit process;
- Identification of subcontractors doing the work;
- Descriptions of areas or units of work being inspected and documented.
- Type of inspection activity and inspection procedure used;
- Recorded observation or test data, with necessary calculations;

- Results of the inspection activity and comparison with specification requirements;
- Problems identified and corrective measures taken to resolve the problems.

10.0 ASSESSMENT AND RESPONSE

Assessments are utilized to increase the user's understanding of the activity being assessed and to provide a basis for improving that activity. URS staff or independent subcontractors may conduct assessments. Assessments are planned and documented based on program or project requirements. Both self-assessments and independent assessments utilize one or more assessment tools such as reviews, surveillance, formal audits and technical documentation reviews. Assessment responsibilities, planning, tools and responses are summarized below and are fully presented in the URS QA SOPs.

10.1 RESPONSIBILITY FOR ASSESSMENTS

QA/R-2 requires that assessments be conducted by personnel who have sufficient authority, access to work areas, and organizational freedom to:

- Identify quality problems;
- Identify and cite practices that may be shared with others to improve the quality of their operations and products;
- Propose recommendations for resolving quality problems;
- Independently confirm implementation and effectiveness of solutions;
- Provide documented assurance to line management that, when problems are identified, further work performed is monitored carefully until the problems are suitably resolved; and
- Suspend or stop work with the concurrence of the PM, QAO, and EPA, upon detection and identification of an immediate adverse condition affecting the quality of results.

This authority and freedom is provided by an independent reporting pathway through the QAO who is responsible to the URS corporate QA Director and PIC as opposed to the PM.

10.2 IMPLEMENTATION OF ASSESSMENTS

Approaches used for the assessments vary with the objectives of the assessment and the status of the project, but are of two basic types:

- Management and technical self-assessment: the qualitative assessment of a management or technical system by those immediately responsible for overseeing and/or performing the work.

- Management and technical independent assessment: the qualitative assessment of management or technical system by someone other than the group performing the work.

Assessments are planned by the URS management staff (PM for program-level activities; PM, or TL for project level activities) in conjunction with the QAO. Field and construction activity supervisors may plan assessments of specific activities in their areas of expertise. The planning process results in a written statement of work or procedure that defines the scope of the assessment and the information needed. The planning process includes:

- Reviewing system and project-specific requirements identified within project plans;
- Defining acceptance criteria;

- Developing an outline or check list of critical technical functions and procedural requirements;
- Defining the responsibility and authority of the person(s) conducting the assessment; and
- Assuring that the personnel scheduled to conduct the assessment have adequate training and experience. The capability of personnel conducting assessments is determined by review of their training, certification, and experience with the program, project, or system being assessed. Assessor qualifications must be equivalent to or higher than the individual whose activity is to be assessed and must have no real or perceived conflict of interest.

The frequency and responsibility for implementation of management assessments is determined by the PM in consultation with the QAO and is based on the level of the activity being assessed. The schedule for management assessments is:

- Annual, independent assessment of the prevailing quality management structure, policies and practices;

- Annual self-assessment of the management and Quality System activities as they impact overall quality of the service and products delivered (e.g., QA Annual Report and Work Plan);

Technical assessments are scheduled by the PM in consultation with the TL but may be requested by the PM. The schedule for technical assessments is based on the status, risk, and activities in progress and is documented in project-specific plans. In addition to scheduled assessments, technical personnel conduct routine, informal assessments of their work and may request a formal assessment to clarify or document unusual or complex activities.

Assessment findings, recommendations, and corrective actions are documented in a report to the PM, QAO (and TL, when appropriate). This report is prepared in accordance with Element 17 of the URS Quality Assurance Manual and includes:

- Names of the parties responsible for the assessment;
- A copy of guidelines developed for the assessment;
- Brief description of the activity assessed;
- Description of any quality problems;
- Recommendations for resolving any quality problems; and
- Suggestions for sharing and noteworthy practices.

10.3 MECHANISMS FOR ASSESSMENT

The tools for assessment include:

- Management systems reviews;
- Quality System reviews;
- Audits and surveillances;
- Independent technical reviews and peer reviews;
- Readiness reviews;
- Data reduction assessment; and

- Data quality assessments.

10.3.1 Management System Review

The URS management system framework and infrastructure, as it impacts the overall quality of the service and products delivered is reviewed to ensure:

- Effectiveness of the system of management controls that are established to achieve and ensure quality;
- Adequacy of resources and personnel provided to achieve and ensure quality in activities;
- The effectiveness of training and audits;
- Applicability of DQOs and software.

The results of management system reviews, as well as accomplishments and significant quality problems are summarized and transmitted to EPA.

10.3.2 Quality System Review

The Quality System is reviewed to assess the effectiveness of the QMP, QAPPS and SOPs, to identify recurring QA problems and to implement corrective actions. Formal annual review of the Quality System is conducted by the QAO. Revisions are prepared by the QAO, with the concurrence of the PM, and issued as a controlled revision to the QMP. Major revisions, that may present significant programmatic impact, are submitted to EPA for approval prior to implementation and necessitate reissuance of a revised QMP.

A written QA report is prepared annually by the QAO containing the results of the QA System review. The following topics are addressed within the report:

- Implementation status, or changes to, the QMP, QAPPs/FSPs and SOPs;
- Significant QA accomplishments, recommendations, and problems;
- Instrument, equipment, or procedural problems that affect QA;
- Measures of data quality and status for meeting DQOs;
- Results of performance and system audits and status of corrective actions;
- Status of QA requirements for subcontracts;
- Summary of QA training; and
- Objectives from the previous report that were not achieved; and
- Work planned for the next reporting period.

10.3.3 Audits and Surveillance

Systems and performance audits and surveillance are conducted as the principal means to determine compliance with the QMP, the site assessment QAPP, site-specific FSPs and QAPPs, and DQOs identified within. Audits and surveillance are used to formally review systems and individual projects, during their course and across levels of management. The QAO has the primary responsibility for conducting audits and surveillance, portions of which may be delegated to an auditing team comprised of senior technical specialists.

Copies of the audit reports are maintained in the QA administrative files and in the project files and are transmitted to the EPA when requested by the EPA. Technical specialists must be familiar with the technical and procedural requirements of both field and laboratory operations, and the associated QA plans. In addition, auditors can not be directly involved with the actual tasks themselves, so as not to introduce bias in the auditing process. Several factors are taken into consideration for determining the scope and frequency for audits and surveillance as follows:

- Complexity of the task order;
- Applicable regulations;
- Program guidance;
- Project or task scope and duration;
- Data quality objectives;
- Deliverable requirements;
- Subcontractor participation;
- Emergency conditions;
- Criticality of data collection; and
- Potential for or frequency of nonconformances.

Surveillance is less formal than audits, but generally they follow the same procedures as an audit. Line management or the QAO may initiate surveillance when a need for such is determined.

An audit or surveillance may be initiated prior to the award of a subcontract to determine the capability of a potential subcontractor; to assess a newly-instituted QA program; when reorganization or major revision has been made to the QAPP or FSPs; to confirm development of SOPs or other controlling documents; when scheduled audits are established by the program or project planning documents; at any time a nonconformance is suspected; or to verify that corrective actions for nonconformance have been implemented.

Procedure 6 of the URS Quality Management System describing auditing procedures and Procedure 7 of the URS Quality Management System describes corrective and preventative actions. Audit steps include provisions for scope, schedule, checklist, findings, nonconformance reports, corrective action, follow-up review of the corrective action, resolution of conflicts, and stop work notices.

The QAO submits notice of any laboratory or field system audits prior to their occurrence and in a timely manner to EPA. Audits are scheduled such that an EPA representative may attend and observe the audit. Surveillance results and subsequent resolution of issues are documented within memoranda and filed with the program or project documents. Four types of audits are as follows:

Performance Audits are used to determine the status and effectiveness of both field and laboratory measurement systems and a quantitative measure of the quality of data generated.

Data Quality Audits are conducted to assess the effectiveness and documentation of the data collection and generation processes and to verify that the generated data are of known and documented quality.

Technical System Audits are used to confirm the adequacy of the data collection (field operation) and data

generation (laboratory operation) systems. The on-site audits are conducted to determine whether the QAPP and SOPs are being properly implemented.

Management System Audits are used to formally review the entire URS program management to determine whether QA is properly implemented for key components of the program. Management system audits also evaluate the ability of the project management to meet programmatic requirements or to meet specified data and information collection DQOs.

10.3.4 Independent Technical Review and Peer Review

An independent technical review is a documented critical review of work of a substantive nature or identified as a deliverable. A peer review is a documented critical review of work characterized by the existence of potential uncertainty. Independent technical reviews are conducted in a variety of areas throughout the URS contract, across lines of management, and involving appropriate technical disciplines. These reviews are conducted by experienced and qualified personnel to ensure the quality and integrity of tasks and products by allowing the work and/or deliverable to undergo objective, critical scrutiny. The QAO and PM are responsible for ensuring that reviewers are independent from actual work or decision-making on the tasks or activities being reviewed, and possess technical qualifications sufficient for conducting the in-depth review. Section 3.4 and 3.5l outline the procedures for Detail Checking and Independent Technical Review, respectively. A written record of the review and resolution of the review findings is incorporated into the project files.

The independent technical review and peer review process is used as a management tool to assess the following:

- Soundness of a technical approach or result;
- Application of complicated problem-solving techniques;
- Changes in the scope of a project;
- Transition between phases of a sampling event;
- Problems identified in a project or report;
- Major decisions made at the planning stage or during the course of a project;
- Potential for erroneous assumptions, data, calculations, methods, or conclusions;
- Basis of design criteria and calculations;
- Construction cost estimates; and
- Constructibility of design.

Independent technical reviews and peer reviews are conducted for (but are not limited to):

- Work Plans;
- FSPs;
- QAPPs;
- Technical approaches;
- Technical memoranda;
- Studies and investigations;
- Reports of site inspections, chemical safety audits, contingency plans;
- Draft and final reports;
- Design criteria;

- Cost estimates;
- Plans and specifications;
- SOPs; and
- Subcontract scopes of work.

10.3.5 Readiness Review

A readiness review is a systematic, documented review of the readiness for the start up or continued use of a facility, process, or activity. Readiness reviews are typically conducted before proceeding beyond project milestones and prior to initiation of a major phase of work. Readiness reviews are performed by the PM, when needed during key successive phases of a project.

10.3.6 Data Reduction Assessment

The project QAPP outlines the procedures for verifying the accuracy of the data reduction process. Each project QAPP describes the methods used to ensure that data transfer is error-free (or has an admissible error rate), that no information is lost in the transfer process, and that the output is completely recoverable from the input. In order to reduce the risks associated with data transfer, this process is kept to a minimum. Data are reduced either manually on calculation sheets or by computer on formatted printouts. The following responsibilities are delegated in the data reduction process:

- Technical personnel document and review their own work and are accountable for its correctness;
- Major calculations receive both a method and an arithmetic check by an independent checker. The checker is accountable for the correctness of the checking process;
- An Independent Technical Review is conducted to ensure the consistency and defensibility of the concepts, methods, assumptions, calculations, etc., as scheduled by the TL; and
- The TL is responsible for ensuring that data reduction is performed in a manner that produces quality data through review and approval of calculations.

Hand Calculations must be legibly recorded on calculation sheets and in logical progression with sufficient descriptions. Major calculations are checked by an engineer or scientist of professional level equal to or higher than that of the originator. After completing the check, the checker signs and dates the calculation sheet immediately below the originator. Both the originator and checker are responsible for the correctness of calculations. A calculation sheet contains the following, at a minimum:

- Project title and brief description of the task;
- Task number and date performed;
- Signature of person who performed the calculation;
- Basis for calculation;
- Assumptions made or inherent in the calculation;
- Complete reference for each source of input data;
- Methods used for calculations; and
- Results of calculations, clearly annotated.

Computer Analysis includes the use of models, programs, data management systems, etc. For published software with existing documentation, test case runs are periodically performed to verify that the software is performing correctly. Both systematic and random error analysis are investigated and appropriate corrective action measures taken.

Documentation for in-house developed models and programs is reviewed by the PM prior to use. This documentation is prepared in accordance with computer program verification procedures and contains at a minimum:

- Description of methodology and engineering basis;
- Major mathematical operations;
- Flow chart presenting the organization of the model or program; and
- Test case(s), sufficiently comprehensive to test model or program operations.

QC procedures for checking models (or programs) involve reviewing the documentation, running the test case, and manually checking selected mathematical operations. Each computer run has a unique number, date, and time associated with it appearing on the printout. QC measures are documented as referenced in applicable procedures.

10.3.7 Data Quality Assessment

Data Quality Assessments are prepared to document the overall quality of data collected in terms of the established DQOs. The data assessment parameters calculated from the results of the field measurements and laboratory analyses are reviewed to ensure that data used in subsequent evaluations are scientifically valid, of known and documented quality, and, where appropriate, legally defensible. In addition, the performance of the overall measurement system is evaluated in terms of the completeness of the project plans, effectiveness of field measurement and data collection procedures, and relevance of laboratory analytical methods used to generate data as planned. Finally, the goal of the data quality assessment is to present the findings in terms of data usability. In summary, the data quality assessment process:

Assesses the quality of data values generated or measured against the established DQOs for parameters such as precision, accuracy, completeness, representatives, and comparability, and against acceptance criteria established for these parameters; and

Achieves an acceptable level of confidence in the decisions that are to be made from measurements and data by controlling the degree of total error permitted in the data through QC checks. Data that fail the QC checks or do not fall within the acceptance criteria established are rejected from further use or qualified for limited use.

The major components of a data quality assessment are presented below and show the logical progression of the assessment leading to determination of data usability:

- Summary of the individual data validation reports for sample delivery groups by analytical method. Systematic problems, data generation trends, general conditions of the data, and reasons for data qualification are presented;

- Description of the procedures used to further qualify data caused by dilution, reanalysis, and duplicate analysis of samples. Examples of the decision logic are provided to illustrate the methods by which qualifiers are applied;

- Evaluation of QC samples such as, field blanks, trip blanks, equipment rinsates, field replicates and laboratory control samples to assess the quality of the field activities and laboratory procedures;

- Assessment of the quality of data measured and generated in terms of accuracy, precision, and completeness through the examination of laboratory and field control samples in relation to objectives established and correct application of statistical methods.

- Summary of the usability of data, based upon the assessment of data conducted during the previous four steps. Sample results for each analytical method are qualified as acceptable, rejected, estimated, biased high, or biased low.

10.4 RESPONSE TO ASSESSMENTS

The PM and TLs review and respond to assessment findings in a timely manner in accordance with URS QA SOPs. This response will depend upon the potential impact and/or time-critical nature of the quality problem. It is the responsibility of the QAO to confirm the implementation and effectiveness of the response action.

- **Time-Critical, Significant Impact.** Example: A field audit finds that a subcontractor is using an inappropriate analytical procedure. The assessor notifies the TL and QAO from the field, discusses alternatives; attempts to take immediate corrective action; and, if necessary, stops work with concurrence of the TL, PM, and EPA.

- **Time-Critical, Minor Impact.** Example: An audit finds that sample labels are messy but information is useable. The assessor notifies the TL and documents the finding.

- **Not Time-Critical, Possible Major Impact.** Example: A management assessment determines that a procedure for sampling is in error. The assessor incorporates a description and recommendation into a report to the PM and QAO. The PM establishes a schedule for corrective action, designates a responsible person, and determines what documentation of the corrective action is required; the QAO follows up to confirm that the corrective action has been implemented.

- **Not Time-Critical, Minor Impact.** Example: A management assessment determines that the numbering system for the procedures is obsolete. The assessor describes the problem; discusses a solution with the responsible person; and reports to the PM that the issue has been resolved; the QAO follows up to confirm that the corrective action has been implemented.

Further discussion of response to assessments including how, when, and by whom corrective actions are taken is continued in Section 11.

11.0 QUALITY IMPROVEMENT

The URS Quality System is designed and continually assessed to minimize problems that affect the quality of the work being undertaken. The ongoing assessment process described in Section 10 includes reviews, audits, surveillances, independent technical reviews and other assessment tools, and reveals both the strengths and weaknesses of the URS Quality System. In addition, EPA evaluations provide important information regarding the practical application of the Quality System as it functions to provide a framework for technical activities on various projects. Improvements to the Quality System are made based on careful review of assessments and evaluations followed by revisions to plans and procedures and subsequent training. It is the responsibility of URS management to provide active leadership and participation in continuous quality improvement to ensure that proper focus is given, adequate resources are provided, and difficult issues are resolved.

The PM receives the QA audits, reviews, surveillance reports, and training records, as well as direct input from EPA program and project managers and URS or subcontractor employees. The PM is responsible for identifying, planning, implementing and evaluating the effectiveness of quality improvement activities. It is the responsibility of the PM to focus on management quality improvements, while the PM focuses on technical quality improvements.

11.1 NON-CONFORMANCE AND CORRECTIVE ACTION

The URS program and project plans, supplementary procedures and training establish the baseline for assessing the Quality System. Management and technical staff follow these plans and procedures during the course of any URS activity, however, on occasion, non-conformances do occur. Each nonconformance is documented by the URS or subcontractor employee observing the nonconformance. Examples of nonconforming work include:

- Items that do not meet the contractual requirements by a subcontractor supplier;
- Errors made in following work instruction or improper work instruction;
- Unforeseen or unplanned circumstances that result in services that do not meet quality/contractual/technical requirements;
- Unapproved or unwarranted deviations from established procedures;
- Errors in craftsmanship or trade skills;
- Non-validated or verified computer programs;
- Sample Chain-of-Custody missing or deficient; and
- Data falling outside established DQO criteria.

Results of QA reviews and audits typically identify the requirement for a corrective action. The QAO is responsible for reviewing audit and nonconformance reports to determine areas of poor quality or failure to adhere to established procedures. Nonconformances are formally reported by the QAO to the TL. The TL is responsible for evaluating reported nonconformances, determining the root cause, conferring with the QAO on the steps to be taken for correction, and executing the corrective action as developed and scheduled. Corrective action measures are selected to prevent or reduce the likelihood of future occurrences and address the root causes to the extent identifiable. Selected measures are appropriate to the seriousness of the nonconformance and are realistic in terms of the resources required for implementation.

In summary, corrective action involves the following steps:

- Discovery of a nonconformance;
- Identification of the responsible party;
- Determination of root causes;
- Plan and schedule of corrective/preventive action;
- Review of the corrective action taken; and
- Confirmation that the desired results were produced.

Procedure 7 of the URS Quality Management System describes the requirements for reporting evaluation and correction of nonconformances that are discovered during the course of an audit or by staff members during the course of project work.

Upon completion of the corrective action, the QAO evaluates the adequacy and completeness of the action taken. If the action is found to be inadequate, the QAO and TL confer to resolve the problem and determine any further actions. The TL schedules implementation of any further action. The QAO will issue a suspend or stop work notice with the concurrence of the PM and EPA in cases where significant problems continue to occur or a critical situation requires work to prevent further discrepancies, loss of data, or other problems. When the corrective action is found to be adequate, the QAO notifies the TL of the closeout of non-conformance.

The QAO maintains a log of nonconformances in order to track their disposition until correction and for trend analysis as necessary. Documentation associated with a nonconformance is entered into the project files and QA administrative files.

11.2 PROACTIVE QUALITY IMPROVEMENT

In addition to the assessment/corrective action approach to quality improvement, URS management and staff are encouraged to present their ideas for quality improvement at any time during the course of their program or project activities. These problems and suggestions are presented and discussed in the context of the overall purpose of the URS contract, at weekly meetings or directly with the QAO, PM or TL. Improvements that do not require revisions in program or project plans are documented in a memo and distributed to staff and, when necessary as determined by the QAO or PM, training sessions are held. Improvements that require revisions to program or project plans require approval of the PM and the EPA. These quality improvements are presented formally in a letter or document revisions and are distributed to potential users.

12.0 TERMS AND DEFINITIONS

The following list of terms and definitions is provided for use with this QMP. Many of the terms are defined as used by EPA in other documents.

Activity - an -inclusive term describing a specific set of operations or related tasks to be performed, either serially or in parallel (e.g., research and development, field sampling, analytical operations, equipment fabrication), that in total result in a product or service.

Assessment - the evaluation process used to measure the performance or effectiveness of a system and its elements. In this Standard, assessment is an -inclusive term used to denote any of the following: audit, performance evaluation, management systems review, peer review, inspection, or surveillance.

Audit - a planned and documented investigative evaluation of an item or process to determine its adequacy and effectiveness as well as compliance with established procedures, instructions, drawings, QAPPs, and/or other applicable documents.

Bias - a systematic displacement of the observations in a statistical sample from the true or accepted value, or a systematic and consistent error in test results.

Calibration - comparison of a measurement standard, instrument or item with a standard or instrument of higher accuracy to detect and quantify inaccuracies and to report or eliminate those inaccuracies by adjustments.

Chain of Custody (C-O-C) - an unbroken trail of accountability that ensures the physical security of samples, data and records.

Characteristic - any property or attribute of a datum, item, process, or service that is distinct, describable, and/or measurable.

Comparability - a measure of the confidence with which one data set can be compared to another.

Completeness - a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct, normal conditions.

Computer Program - a sequence of instructions suitable for processing by a computer. Processing may include the use of an assembler, a compiler, an interpreter, or a translator to prepare the program for execution. A computer program may be stored on magnetic media, and be referred to as "software," or may be stored permanently on computer chips, and be referred to as "firmware." Computer programs covered by this Standard are those used for design analysis, data acquisition, data reduction, data storage (data bases), operation or control, and data base or document control registers when used as the controlled source of quality information.

Confidentiality Procedure - a procedure used to protect confidential business information (including proprietary data and personnel records) from unauthorized access.

Configuration - the functional, physical and procedural characteristics of an item, experiment or document.

Conformance - an affirmative indication or judgment that a product or service has met the requirements of the relevant specifications, contract or regulation; also the state of meeting the requirements.

Consensus Standard - a standard established by a group representing a cross section of a particular industry or trade, or a part thereof.

Contractor - any organization or individual that contracts to furnish services or items or perform work.

Corrective Action - measures taken to rectify conditions adverse to quality and, where necessary, to preclude their recurrence.

Customer - any individual or organization for whom items or services are furnished or work performed in response to defined requirements and expectations. See also Participant and User.

Data Quality Objectives (DQOs) - established quantitative measurements (with associated precision and bias or acceptable uncertainty) that must be obtained from the environmental data operations in order to demonstrate that the desired and expected result has been achieved. Such measurements are defined and established using the DQO Planning Process.

Data Quality Objectives Planning Process - a systematic planning tool based on decision analysis and operations research methodology to identify and define the type, quality, and quantity of data needed and expected from environmental data operations in order to satisfy a specified use. The process encompasses strong dependence on user participation and on the use of statistics. The key elements of the process include:

- Understanding the user's problem or concerns that require resolution;
- Identifying the specific result that will fully satisfy the problem or concerns;
- Defining the data and the performance measures necessary to demonstrate the resolution of the problem or concerns;
- Establishing error probabilities for making incorrect conclusions;
- Specifying the criteria for the measurements that will yield the expected results within acceptable error probabilities for the intended use of the results; and
- Optimizing the survey (or experimental) design for resource effectiveness.

Data Usability - the process of ensuring or determining whether the quality of the data produced meets the intended use of the data.

Deficiency - an unauthorized deviation from acceptable procedures or practices, or a defect in an item.

Design - specifications, drawings, design criteria and performance requirements. Also the result of deliberate planning, analysis, mathematical manipulations, and design processes.

Design Change - any revision or alteration of the technical requirements defined by approved and issued design output documents and approved and issued changes thereto.

Design Review - a documented evaluation by a team, including personnel such as the responsible designers, the customer for the work or product being designed, and a QA representative, but other than the original designers, to determine if a proposed design will meet the established design criteria and perform as expected when implemented.

Document - any written or pictorial information describing, defining, specifying, reporting or certifying activities, requirements, procedures or results.

Engineered Environmental Systems - an -inclusive term used to describe pollution control devices and systems, waste treatment processes and storage facilities, and site remediation technologies and their components that may be utilized to remove pollutants or contaminants from the environment. Examples include wet scrubbers (air), soil washing (soil), granulated activated carbon unit (water), and filtration (air, water). Usually this term will apply to hardware-based systems; however, it will also apply to methods or techniques used for pollutant reduction or containment of contamination to prevent further movement of the contaminants, such as capping, solidification or vitrification, and biological treatment.

Environmental Conditions - the description of a physical medium (e.g., air, water, soil, sediment) or biological system expressed in terms of its physical, chemical, radiological, or biological characteristics.

Environmental Data - any measurements or information that describe environmental processes or conditions, or the performance of environmental systems.

Environmental Data Operations - work performed to obtain, use, or report information pertaining to environmental processes and conditions.

Environmental Monitoring - the process of measuring or collecting environmental data.

Environmental Processes - manufactured or natural processes that produce discharges to or that impact the ambient environment.

Environmental Programs - an -inclusive term pertaining to any work or activities involving the environment, including but not limited to: characterization of environmental processes and conditions; environmental monitoring; environmental research and development; the design, construction, and operation of environmental technologies; and laboratory operations on environmental samples.

Environmental Technology - an -inclusive term used to describe pollution control devices and systems, waste treatment processes and storage facilities, and site remediation technologies and their components that may be utilized to remove pollutants or contaminants from or prevent them from entering the environment. Examples include wet scrubbers (air), soil washing (soil), granulated activated carbon unit (water), and filtration (air, water). Usually, this term will apply to hardware-based systems; however, it will also apply to methods or techniques used for pollution prevention, pollutant reduction, or containment of contamination to prevent further movement of the contaminants, such as capping, solidification or vitrification and biological treatment.

Evidentiary Records - records identified as part of litigation and subject to restricted access, custody, use and disposal.

Expedited Change - an abbreviated method of revising a document at the work location where the document is used when the normal change process would cause unnecessary or intolerable delay in the work.

Financial Assistance - the process by which funds are provided by one organization (usually government) to another organization for the purpose of performing work or furnishing services or items. Financial assistance mechanisms include grants, cooperative agreements, and government interagency agreements.

Finding - an assessment conclusion that identifies a condition having a significant effect on an item or activity. An assessment finding may be positive or negative, and is normally accompanied by specified examples of the observed condition.

Graded Approach - the process of basing the level of application of managerial controls applied to an item or work according to intended use of the results and the degree of confidence needed in the quality of the results. (See Data Quality Objectives Planning Process.)

Guideline - a suggested practice that is non-mandatory in programs intended to comply with a standard.

Hazardous Waste - any waste material that satisfies the definition of "hazardous waste" as given in 40 CFR Part 261, "Identification and Listing of Hazardous Waste."

Independent Assessment - an assessment performed by a qualified individual, group, or organization that is not a part of the organization directly performing and accountable for the work being assessed.

Inspection - examination or measurement of an item or activity to verify conformance to specific requirements.

Item - an -inclusive term used in place of the following: appurtenance, facility, sample, assembly, component, equipment, material, module, part, product, structure, subassembly, subsystem, system, unit, documented concepts, or data.

Management - those individuals directly responsible and accountable for planning, implementing, and assessing work.

Management System - a structured non-technical system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for conducting work and producing items and services.

Management Systems Review (MSR) - the qualitative assessment of a data collection operation and/or organization(s) to establish whether the prevailing quality management structure, policies, practices, and procedures are adequate for ensuring that the type and quality of data needed are obtained.

May - denotes permission but not a requirement.

Measurement and Testing Equipment - tools, gauges, instruments, sampling devices or systems used to calibrate, measure, test or inspect in order to control or acquire data to verify conformance to specified requirements.

Method - a body of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, quantification) systematically presented in the order in which they are to be executed.

Mixed Waste - hazardous waste material as defined by 40 CFR 261 (RCRA) and mixed with radioactive waste subject to the requirements of the Atomic Energy Act.

Must - denotes a requirement that has to be met.

Nonconformance - a deficiency in characteristics, documentation or procedure that renders the quality of an item or activity unacceptable or indeterminate.

Objective Evidence - any documented statement of fact, other information or record, either quantitative or qualitative, pertaining to the quality of an item or activity, based on observations, measurements or tests which can be verified.

Observation - an assessment conclusion that identifies a condition (either positive or negative), which does not represent a significant impact on an item or activity. An observation may identify a condition that does not yet cause a degradation of quality.

Participant - when used in the context of environmental programs, an organization, group or individual that takes part in the planning and design process and provides special knowledge or skills to enable the planning and design process to meet its objective.

Peer Review - a documented critical review of work generally beyond the state of the art or characterized by the existence of potential uncertainty. The peer review is conducted by qualified individuals (or organization) who are independent of those who performed the work, but are collectively equivalent in technical expertise (i.e., peers) to those who performed the original work. The peer review is conducted to ensure that activities are technically adequate, competently performed, properly documented, and satisfy established technical and quality requirements. The peer review is an in-depth assessment of the assumptions, calculations, extrapolations, alternate interpretations, methodology, acceptance criteria, and conclusions pertaining to specific work and of the documentation that supports them. Peer reviews provide an evaluation of a subject where quantitative methods of analysis or measures of success are unavailable or undefined, such as in research and development.

Performance Evaluation (PE) - a type of audit in which the quantitative data generated in a measurement system are obtained independently and compared with routinely obtained data to evaluate the proficiency of an analyst or laboratory.

Pollution Prevention (P2) - an organized, comprehensive effort to systematically reduce or eliminate pollutants or contaminants prior to their generation or their release or discharge to the environment.

Precision - a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions, expressed generally in terms of the standard deviation.

Procedure - a documented set of steps or actions that systematically specifies or describes how an activity is to be performed.

Process - an orderly system of actions that is intended to achieve a desired end or result. Examples of processes include analysis, design, data collection, operation, fabrication, and calculation.

Project - an organized set of activities within a program.

Qualified Data - any data that have been modified or adjusted as part of statistical or mathematical evaluation, data validation, or data verification operations.

Qualified Services - an indication that suppliers providing services have been evaluated and determined to meet the technical and quality requirements of the customer, as provided by approved procurement documents and demonstrated by the supplier to the customer's satisfaction.

Quality - the totality of features and characteristics of a process or service that bears on its ability to meet the stated or implied needs and expectations of the user.

Quality Assurance (QA) - an integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the customer.

Quality Assurance Program Description/Plan - see Quality Management Plan.

Quality Assurance Project Plan (QAPP) - a formal document describing in comprehensive detail the necessary QA, QC, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria.

Quality Control (QC) - the overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer.

Quality Improvement - a management program for improving the quality of operations. Such management programs generally entail a formal mechanism for encouraging worker recommendations with timely management evaluation and feedback or implementation.

Quality Indicators - measurable attributes of the attainment of the necessary quality for a particular environmental decision. Indicators of quality include precision, bias, completeness, representativeness, reproducibility, comparability, and statistical confidence.

Quality Management - that aspect of the overall management system of the organization that determines and implements the quality policy. Quality management includes strategic planning, allocation of resources, and other systematic activities (e.g., planning, implementation, and assessment) pertaining to the quality system.

Quality Management Plan (QMP) - a formal document that describes the quality system in terms of the organizational structure, functional responsibilities of management and staff, lines of authority, and required interfaces for those planning, implementing, and assessing activities conducted.

Quality System - a structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required QA and QC.

Radioactive Waste - waste material containing radionuclides, or contaminated by radionuclides, subject to requirements of the Atomic Energy Act.

Readiness Review - a systematic, documented review of the readiness for the Start up or continued use of a facility, process, or activity. Readiness reviews are typically conducted before proceeding beyond project milestones and prior to initiation of a major phase of work.

Record (Quality Assurance) - a document that furnishes evidence of the quality of items or activities and that has been verified and authenticated as technically complete and correct. Records may include photographs, drawings, magnetic tape, and other data recording media.

Remediation - the process of reducing the concentration of a contaminant (or contaminants) in air, water, or soil media to a level that poses an acceptable risk to human health.

Representativeness - a measure of the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition or an environmental condition.

Reproducibility - the precision, usually expressed as a standard deviation, which measures the variability among the results of measurements of the same sample at different laboratories.

Research (Applied) - a process, the objective of which is to gain knowledge or understanding necessary for determining the means by which a recognized and specific need may be met.

Research (Basic) - a process, the objective of which is to gain fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward processes or products in mind.

Research Development/Demonstration - Systematic use of the knowledge and understanding gained from research and directed toward the production of useful materials, devices, systems, or methods, including prototypes and processes.

Self-Assessment - Assessments of work conducted by individuals, groups, or organizations directly responsible for overseeing and/or performing the work.

Service - the category of economic activity that does not produce manufactured items. In environmental data operations or engineering projects, such activities include design, inspection, laboratory and/or field analysis, repair, and installation.

Shall - denotes a requirement that is mandatory and has to be met.

Should - denotes a guideline or recommendation.

Significant Condition - any state, status, incident, or situation of an environmental process or condition of an engineered environmental system in which the work being performed will be adversely affected in a manner sufficiently serious to require corrective action to satisfy quality objectives or specifications and safety requirements.

Software Life Cycle - the period of time that begins when a software product is conceived and ends when the software product is no longer available for routine use. The software life cycle typically includes a requirements phase, a design phase, an implementation phase, a test phase, an installation and checkout phase, an operation and maintenance phase, and sometimes a retirement phase.

Source Reduction - any practice that reduces the quantity of hazardous substances, contaminants or pollutants.

Standard Operating Procedure (SOP) - a written document that details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps, and that is officially approved as the method for performing certain routine or repetitive tasks.

Supplier - any individual or organization furnishing items or services or performing work according to a procurement document or financial assistance agreement. This is an -inclusive term used in place of any of the following: vendor, seller, contractor, subcontractor, fabricator, or consultant.

Surveillance - the act of monitoring or observing a process or activity to verify conformance to specified requirements.

Technical Review - a documented critical review of work that has been performed within the state of the art. The review is accomplished by one or more qualified reviewers who are independent of those who performed the work, but are collectively equivalent in technical expertise to those who performed the original work. The review is an in-depth analysis and evaluation of documents, activities, material, data or items that require technical verification or validation for applicability, correctness, adequacy, completeness, and assurance that established requirements are satisfied.

Technical Systems Audit (TSA) - a thorough, systematic on-site, qualitative audit of facilities, equipment, personnel, training, procedures, record keeping, data validation, data management, and reporting aspects of a system.

User - when used in the context of environmental programs, an organization, group or individual that utilizes the results or products from environmental programs. A user may also be the customer for whom the results or products were collected or created.

Validation - an activity that demonstrates or confirms that a process, item, data set, or service satisfies the requirements defined by the user.

Verification - the act of authenticating or formally asserting the truth that a process, item, data set, or service is, in fact, that which is claimed.

Work - the process of performing a defined task or activity (e.g., research and development, field sampling, analytical operations, equipment fabrication).

13.0 LIST OF REFERENCES

American Society for Quality Control (ASQC). 1994. Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs, Draft. ANSI/ASQC E4 - 1994, January 1994.

U.S. Environmental Protection Agency (EPA). 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA. Interim Final. EPA/540/G-89/004.

U.S. Environmental Protection Agency (EPA). 2000. EPA Order CIO 2105.0, Policy and Program Requirements for the Mandatory Agency-Wide Quality System, May 2000.

U.S. Environmental Protection Agency (EPA). 2001a. EPA Requirements for Quality Management Plans. EPA QA/R-2, EPA240/B-01/002, March 2001 (Reissued May 31, 2006).

U.S. Environmental Protection Agency (EPA). 2001b. EPA Requirements for Quality Assurance Project Plans. EPA QA/R-5, EPA/240/B-01/003, March 2001 (Reissued May 31, 2006).

U.S. Environmental Protection Agency (EPA). 2004. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. EPA540/R-04-004, October 2004.

U.S. Environmental Protection Agency (EPA). 2005. Guidance on Quality Assurance for Environmental Technology, Design, Construction and Operation. EPA/240/B-05/001, January 2005.

U.S. Environmental Protection Agency (EPA). 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4. EPA/240/B-06/001. February 2006.

U.S. Environmental Protection Agency (EPA). 2007. Guidance for the Preparation of Standard Operating Procedures (SOPs), EPA QA/G-6. EPA 600/B-07/001. April 2007.

U.S. Environmental Protection Agency (EPA). 2008a. USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review. EPA 540-R-08-01, June 2008.

URS Corporation (URS). 2009. Safety Management Standards.

URS Corporation (URS). 2008. Quality Management System Documentation, November 2008.